



Inside Ag

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Microbiology Program

The Colorado Department of Agriculture's (CDA) Biochemistry Laboratory provides analytical testing services to the Inspection & Consumer Services (ICS), Plant Industry, and Conservation Services Divisions. Analyses are performed on a wide variety of samples including pesticides, pet animal and livestock feeds, fertilizers, soils, sediments, vegetation, and water. The Biochemistry Laboratory (BCL) is organized into six sections: Microbiology, Pesticides, Groundwater, Fertilizer, Feeds, and Drugs and Vitamins.



The Microbiology Section analyzes livestock feed samples to verify antibiotic labeling guarantees and ensure compliance with the Food and Drug Administration (FDA) Bovine Spongiform Encephalopathy (BSE) Rule. In addition, some animal feeds and feed ingredients are screened for pathogenic bacteria and mycotoxins that may pose a risk to human or animal health.

As part of the ICS BSE prevention program, the Microbiology Section analyzes ruminant animal feeds for the presence of any feed material prohibited for ruminant feeding under the FDA's BSE Rule. The goal of

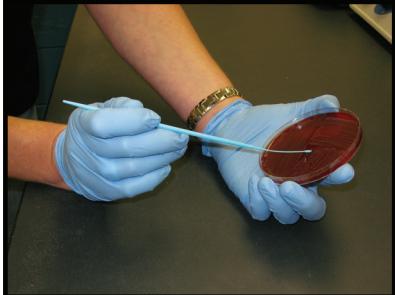
this program is to ensure that certain types of animal protein are not used in the formulation and production of cattle feeds. Samples collected by ICS inspectors are submitted to the laboratory and examined microscopically for prohibited materials.

Since 2004, 460 feed samples were tested for prohibited materials. No violations have been found.



The Microbiology Section also analyzes environmental samples collected from Colorado custom meat processing plants. These facilities process domestic and wild game meats that are intended solely for consumption by the owner of the animal. Meat and meat products that originate from these plants cannot be sold. Processing packing plants that sell or distribute meat must be inspected by the United States Department of Agriculture (USDA).

During inspections of custom meat processing plants, ICS inspectors collect environmental sample swabs from processing equipment, meat storage areas, and other surfaces that may come into contact with meat that is processed. The Microbiology Section analyzes these swabs by testing for certain bacteria such as *Salmonella*, pathogenic *Escherichia coli* (*E. coli*) and fecal coliform. This testing verifies that the plant is properly handling meat during processing and adhering to good sanitation practices.



The Microbiology Section also participates in the USDA Microbiological Data Program (MDP). CDA and eight other State Departments of Agriculture laboratories currently participate in this grant program. For this program, BCL microbiologists test for presence of pathogenic bacteria on fresh commodities (produce). Commodities currently tested include lettuce, spinach, cantaloupe, tomatoes, and alfalfa sprouts. Participation in this program has provided the BCL with state-of-the-art equipment that enables microbiologists to screen large volumes of samples for *Salmonella*, *E. coli* O157:H7, enterotoxigenic and shiga toxin producing *E. coli*, and *Shigella*. In 2008, BCL microbiologists detected and isolated a *Salmonella* species from fresh spinach that was linked to 15 unsolved illnesses in Texas and three in Arizona.

In the summer of 2008, CDA was awarded a \$245,000 grant from the USDA Food Safety and Inspection Service (FSIS) Food Emergency Response Network (FERN). FERN is a national consortium of State and Federal Agriculture and Public Health laboratories. The goal of FERN is rapid and effective response to food-borne emergencies such as a nationwide food borne illness outbreak or an act of bioterrorism. As part of the FERN network, the Microbiology Section is conducting leading-edge research on improved, rapid methodologies to detect human pathogens in fresh produce and other high-risk food commodities. This research will help facilitate more rapid screening and identification of pathogen-causing illnesses. A recent example of such an illness where rapid screening and detection was important was the *Salmonella Saint Paul* outbreak that was ultimately linked to jalapeno peppers.

Technologies currently used in the Microbiology Section include Real-time Polymerase Chain Reaction (RT-PCR) for the rapid amplification and detection of target DNA, automated immunoassay, immunomagnetic separation for isolation of pathogens, and electrochemiluminescence which allows for the detection of bioterrorism agents such as Ricin, and *Bacillus anthracis* and *Clostridium botulinum* toxins in less than one minute. These technologies, coupled with the experience and expertise of BCL microbiologists, enable CDA's Biochemistry Laboratory to advance human and animal food protection science in Colorado.